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2002 Leopold Grape Cultivar by Management System Trial

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Abstract
To identify grape cultivars adapted to Iowa, a cultivar by management system trial was established in 2002 at the ISU Horticulture (Hort) Station and the ISU Armstrong Research Farm with the help of a grant from the Leopold Center of Sustainable Agriculture. Fifteen cultivars, including 10 wine and 5 seedless table cultivars, were evaluated under 1) a conventional management system that relies on herbicides for weed control and application of insecticides and fungicides on a regular basis; 2) an IPM/best management system that uses herbicides as needed and relies on monitoring to determine the need for insecticides and fungicides; and 3) an organic-approved system that relies on a straw mulch for weed control and the use of organic-approved insect and disease control strategies. This report summarizes the results for the 2005 growing season.

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Introduction

To identify grape cultivars adapted to Iowa, a cultivar by management system trial was established in 2002 at the ISU Horticulture (Hort) Station and the ISU Armstrong Research Farm with the help of a grant from the Leopold Center of Sustainable Agriculture. Fifteen cultivars, including 10 wine and 5 seedless table cultivars, were evaluated under 1) a conventional management system that relies on herbicides for weed control and application of insecticides and fungicides on a regular basis; 2) an IPM/best management system that uses herbicides as needed and relies on monitoring to determine the need for insecticides and fungicides; and 3) an organic-approved system that relies on a straw mulch for weed control and the use of organic-approved insect and disease control strategies. This report summarizes the results for the 2005 growing season.

Materials and Methods

The vines were planted at a spacing of 8 ft × 10 ft (545 vines/acre) with three vines/replication. Treatments were replicated five times at the Hort Station and three times at the Armstrong Farm. The vines were trained to the bilateral cordon system on a two-wire trellis with wires at 3.5 ft and 6.0 ft above the ground. Vines with a procumbent (trailing) growth habit are trained to the top wire, while those with a semi-upright to upright growth habit are trained to the mid-level wire with three sets of catch wires added above.

During the 2004–2005 dormant period and at bud break, three freezing events occurred that influenced the results for 2005: October 2–4, 2004, January 15–17, 2005, and May 3–4, 2005, with temperatures of 29°F, -19°F, and 24°F, respectively, at the Horticulture Station. The temperatures on the same dates at the Armstrong Farm were 28°F, -11°F, and 30°F, respectively.

The vines were pruned in the spring to either 1/4-inch-diameter spurs or to what appeared to be live tissue. The 1-year-old trimmings were weighed, and the weight was used to determine the number of buds retained/vine.

Results and Discussion

Vines in the organic-approved management system had lowest pruning weights at both sites (Table 1). Differences among cultivars were evident with La Crosse being the most vigorous at both sites. However, with the early fall frost and mid-January freeze, many cultivars exhibited cane dieback, which can significantly alter the weight of the trimmings. This was particularly evident on Marquis and Vanessa vines at both sites, and for Traminette, Chambourcin, and Seyval Blanc at the Hort Station. This was also reflected by considerable trunk dieback on Traminette, Marquis, Chambourcin, and Seyval Blanc vines at the Hort Station (Table 1). Vines in the organic-approved management system exhibited slightly more trunk dieback than in the other management systems. This was attributed to the effect of the mulch in delaying fall acclimation of the vines. Exposure to the mid-January freeze contributed to the high incidence of crown gall at the Hort Station, but not at the Armstrong Farm (Table 1). The incidence of crown gall was higher in the organic-approved plots than in the other plots. Among cultivars, Chambourcin vines exhibited the highest incidence of the disease, followed by Vignole, Seyval Blanc,

Vanessa, Maréchal Foch, Traminette, Cynthiana, and Marquis.

An early May freeze occurred during bud break, and the severity of injury was rated (Table 2). Generally, cultivars that exhibited greater injury were those that emerged earlier. However, Frontenac was one of the first cultivars to emerge, but exhibited only moderate injury. After the frost, the live shoots derived from primary buds were counted, and the percentage of surviving primary buds was calculated based on the pruning weights (Table 2). Low survival rates were a reflection of the frost injury and low temperatures to which the vines were exposed in mid-January. For later-emerging cultivars such as Chambourcin, Traminette, Marquis, and Seyval Blanc, the mid-January freeze was probably the major contributor to the low primary bud survival.

Because 2005 was the first year for fruit production, vines with high cluster numbers were thinned to either one or two clusters/shoot depending on the cultivar's cluster-size characteristics. Following *veraison,* the time when grape growth stops and the color turns to deep red or dark purple, testing for percent soluble solids, pH, and titratable acidity was commenced to determine when to harvest. However, to avoid total crop loss from feeding by raccoons, honey bees, or spotted Asian ladybird beetles, some cultivars had to be harvested early, particularly at the Hort Station. At harvest, the number of clusters/vine and yield/vine were recorded and the average cluster weight was calculated (Table 2). Where damage from pests was extensive, yield/vine was estimated based upon cluster counts, pedicels/cluster, and berry size or the weight of intact clusters. Yield/vine was a reflection of low primary bud survival rates, particularly at the Hort Station.

Vines at both locations were exposed to 2,4-D herbicide drift (data not shown). Injury to the foliage was more severe at the Armstrong Farm than at the Hort Station. Among cultivars, the severity of injury observed followed a similar trend as reported in previous years, with Vanessa and Cynthiana vines exhibiting the greatest injury, while Frontenac, La Crosse, Seyval Blanc, Vignole, and Chambourcin vines exhibited little or no injury.

Because the vines were carrying a crop, a more extensive disease control program was maintained in 2005. Little or no incidence of powdery mildew, downy mildew, or black rot was observed. However, anthracnose was observed, but it was generally confined to vines in the organic-approved plots where a fixed copper fungicide was used for disease control (data not shown). Among cultivars, it was most evident on Marquis and Reliance with some showing up on Edelweiss and an isolated incidence on Frontenac.

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Table 1. Pruning weights, percentage of trunk establishment, and percentage of vines with crown gall for 15 cultivars in the ISU 2002 grape cultivar by management system trial for 2005.

	Pruning weight (lb)		% Trunk establishment [z]		% Vines w/ crown gall	
Treatment	Hort Station	Armstrong	Hort Station	Armstrong	Hort Station	Armstrong
Management system						
Conventional	1.8	1.8	71	92	22	1
IPM/best mgmt	1.6	2.0	68	93	25	0
Organic-approved	1.1	1.7	64	85	38	4
LSD, .05	.4	.1	5	6		
Cultivar						
Maréchal Foch	1.5	.4	93	75	37	0
Frontenac	2.3	2.1	98	100	2	0
Cynthiana	1.5	1.2	79	96	33	0
St. Croix	2.0	1.9	93	98	4	0
Chambourcin[y]	1.3	3.1	33	91	94	4
Seyval Blanc[y]	1.4	3.1	38	70	48	4
La Crosse[y]	3.7	4.0	100	100	2	0
Vignole[y]	1.1	2.7	64	100	65	0
Traminette[y]	.8	2.6	15	95	34	4
Edelweiss	1.7	1.7	98	100	2	0
Marquis	.3	.7	19	91	31	4
Vanessa	.7	.4	75	77	47	10
Reliance	1.4	1.2	97	98	4	0
Mars	2.1	1.5	91	99	18	0
Jupiter[x]	.3	.5	4	59	2	0
LSD, P<.05	.3	.5	10	10		

[z] Percentage of distance to the cordon wire.
[y] Trained to VSP.
[x] Planted in 2003.

Table 2. Percentage of primary bud survival following an early May freeze, percentage of primary bud survival, and yield/vine for 15 cultivars in the ISU 2002 grape cultivar by management system trial for 2005.

	Spring frost rating [z]		% Primary bud survival		Yield [y] per vine (lb)		Average cluster wt (oz)	
Treatment	Hort	Armst	Hort	Armst	Hort	Armst	Hort	Armst
Management System								
Conventional	2.9	1.1	24	55	1.8	7.8	4.4	4.9
IPM/best mgmt	3.1	1.1	25	51	1.8	7.9	4.3	5.0
Organic-approved	2.8	1.0	29	58	1.7	6.4	4.5	4.3
LSD <.05	.3	.06	ns	ns	ns	1.2	ns	.5
Cultivar								
Maréchal Foch	4.9	2.8	17	60	1.9	2.9	2.0	2.0
Frontenac	3.2	1.4	62	56	5.9	6.5	4.6	3.6
Cynthiana	2.5	1.1	49	75	4.3	6.3	3.5	2.1
St. Croix	4.8	1.2	23	66	2.6	9.1	4.0	3.4
Chambourcin	.1	.0	6	30	.4	11.4	10.2	9.9
Seyval Blanc	2.2	.3	12	42	.8	9.6	6.7	9.2
La Crosse	4.6	1.3	43	43	5.3	10.3	4.1	4.1
Vignole	1.7	.1	23	62	.9	8.1	3.4	3.1
Traminette	.3	.7	12	50	.1	9.6	4.1	4.2
Edelweiss	4.9	1.7	14	52	1.5	11.4	7.7	7.0
Marquis	.7	1.2	6	61	.1	4.3	6.6	5.3
Vanessa	3.2	1.5	5	43	<.1	1.2	2.1	2.4
Reliance	3.9	1.0	15	67	.7	7.6	5.3	4.9
Mars	4.3	1.2	25	78	1.9	11.1	3.8	4.5
Jupiter[x]	1.3	.6	0	19	.0	1.0	-	5.8
LSD, P<.05	.5	.3	8	9	.6	2.0	.7	.6

[z] Frost injury scale 0–5: 0=no shoot emergence; 1=shoots emerged, no apparent injury; 2=slight symptoms; 3=moderate; 4=severe; 5=very severe.

[y] Due to feeding by raccoons, honey bees, and/or spotted Asian ladybird beetles, yields were often estimated at the Hort Station and sometimes at the Armstrong Farm based upon cluster counts, pedicels per cluster, and berry size or the weight of intact clusters.

[x] Planted in 2003.